

PORTLAND FIRE WEATHER – 2005 ANNUAL REPORT

2005 FIRE SEASON OVERVIEW

Early indications pointed to an active 2005 fire season for Northwest Oregon and Southwest Washington, similar to the busy seasons of 2000 and 2002. This was based on the meager snow pack, and very dry January and February. However, the season turned out to be quiet. Despite the lack of mountain snowfall, a wet spring and a significant rainfall in early October contributed to a shortened critical fire period. The active portion of the fire season was generally limited to mid-July through early September.

The pre-season precipitation was below normal. During the winter, precipitation was well below normal, especially in January and February. The dry pattern continued into March, but a change to a wetter regime took place in mid-March. The wet pattern continued through spring, and persisted into early July. An abrupt shift to summer conditions occurred in mid-July. Unlike 2004, when a major late-August rain event ended the season, the active portion of the 2005 season went into mid-September. Significant rainfall and mountain snow in late September and early October signified the end of the 2005 fire season.

The snow pack at Government Camp was generally non-existent. There were a few inches of snow on the ground in late November. The snow depth increased to 24 inches by early December, but dwindled to five inches by the end of the month. The snow pack never recovered. By mid-January the snow pack was back near 20 inches, but then the precipitation ended. On January 24th, the ground was essentially bare. An early February storm resulted in around a foot of snow, but minimal precipitation thereafter brought the snow depth back down to just an inch by the end of February. The ground remained bare through much of March, but an abrupt shift to a cooler and wetter regime during the latter half of March resulted in a renewed snow pack. The March snow pack was short-lived, and by mid-April the minimal snow pack had vanished. Typically, the snow pack hits its first peak in mid-January, and peaks again in early to mid-March. In a normal year, snow depth at Government Camp reaches around 50 inches in early March. In 2005, the highest recorded snow depth at Government Camp was 24 inches, on December 7th and 8th. Government Camp snow pack normally lasts through early June, but this was not the case in 2005. Snow-water equivalent values in the Cascades were 25 to 35 percent of normal in February.

The wet spring resulted in extremely low fuel indices in May, June and early July. All areas exhibited Energy Release Components (ERC) values under 10 in May and June. In fact, ERC values for the coastal strip zones (601 and 612) did not exceed 10 until the period of July 21-31. However, when the precipitation ended in mid-July, ERC values throughout the region showed quick rises. Critical ERC values were common in August and early September. Critical ERC conditions occur when the ERC values meet or exceed the 95th percentile in a given area. Zones 606 and 608 exceeded 97th percentile ERC values in mid-August with a 10-day average of 56.3. There were single-day averages near 60 during the 10-day period. In 2004, critical ERC values in the Central Oregon Cascades occurred on 20 days, compared to 33 days in 2005. The South Washington and North Oregon Cascades and foothills exhibited the same trend. In 2004,

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ERC values exceeded critical levels on just eight days. In 2005, critical ERC values occurred on 22 days. The 100-hour fuel moisture values showed similar trends.

A major wetting rain at the end of September turned out to be the season-ending event. Rainfall totals September 29th and 30th were on the order of two to five inches in many areas of the Coast Range, Cascades, and Cascade Foothills. Isolated locations received over five inches in the two-day period. ERC values plummeted from near-critical values on September 27th to 9-16 in the first week of October. Conditions remained cool and wet through much of October. More importantly, for fuel considerations, there were no late-season east wind events.

There were three critical fire weather events this season. Two of the three events were wind and low humidity, and the other was for a dry and unstable air mass (see ***CRITICAL FIRE WEATHER EVENTS*** section, pages 30-36). No lightning events occurred. Nearly all areas experienced normal lightning activity in 2005. However, the majority of lightning days occurred during the late spring, with moist conditions during a period of low fuel indices. There were no late-season east-wind events in 2005, which was quite rare.

There were no changes in Red-Flag criteria for the 2005 season, other than a name change for “dry lightning”. The term “episode lightning” was used in 2004. The “episode lightning” concept was devised by the Northwest Coordination Center. However, some users found the term to be confusing. The main premise was to devise Red-Flag criteria highly dependent on current and forecast fuel conditions before, during, and after a significant weather event. The idea was to get away from the subjectivity inherent in the dry lightning concept. The new criteria also provided a better means of verification. The term “episode lightning” was changed for 2005 to “lightning with no appreciable precipitation”.

The forecast district **did not** have a major fire in 2005. A major fire is defined as 100 acres or an incident that requires a Type II management team. The closest fires were in the Pendleton Forecast Area. The Willamette National Forest had several small fires, none of which exceeded 100 acres. No Incident Meteorologists (IMETS) were dispatched to the Portland Fire Weather district. However, the Portland IMETS provided support on one incident during 2005.

Spot forecast activity in 2005 was fairly quiet. The transfer of zones 609, 610, and 611 to Pendleton in 2004 resulted in a major decrease in spot forecast requests. The 2005 spot forecast total of 84 was the lowest since 1998 when there were 83 spot forecasts.

Despite the lack of fire activity, and minimal IMET support, training and outreach remained a significant part of the fire weather program. The Portland office staff participated in many teaching activities, beginning as early as January. There were teaching requests into June. The Portland office provided assistance to its former east-side users as well.

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2005 PRE-SEASON: PRECIPITATION

Table One (below) shows precipitation amounts for various locations from fall through spring. All sites exhibited below normal totals, with some areas well below normal. The Willamette Valley received about 60 to 75 percent of normal. February was an extremely dry month. Eugene and Astoria had the third-driest February on record. It was the fifth-driest February at Portland. The two-month total (January and February) of 3.24 inches at Portland was the third driest on record. In 1985, a scant 1.85 inches of precipitation occurred, and in 2001 the airport measured 2.76 inches. Overall, the Willamette Basin had 38 percent of normal precipitation in January, and a mere 23 percent in February. The North Coast Basin fared a little better in January, with 61 percent of normal precipitation. February was a different story; just 24 percent of normal precipitation occurred. It was so dry that land use agencies in the Cascades were able to get a head start on prescription activities.

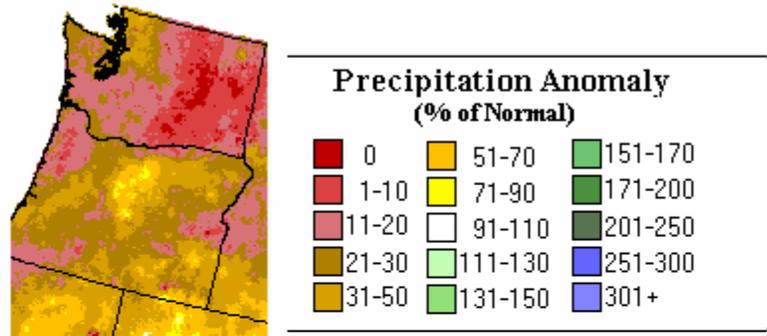
The monthly precipitation distribution was quite variable. Most locations experienced below-normal amounts from November through February, slightly above normal rainfall in March, then above to well above normal precipitation in April and May. The extended dry spell lingered through the second week of March. The rest of March was quite wet. The Portland airport had measurable rainfall 36 out of 46 days in the period March 26 to May 10. Early prognostications for fire season 2005 painted a grim picture, based on the rather sparse rainfall during January and February and the miniscule snow pack. Several experts expected 2005 to be a repeat of, or worse than, the busy fire years of 2000, 2002, and 2003.

(TABLE ONE) 2004-2005 WET SEASON PRECIPITATION SUMMARY

	NOV	DEC	JAN	FEB	MAR	APR	MAY	TOT	AVE	PCT AVE
Astoria	6.70	7.24	5.78	3.30	7.66	8.32	5.46	44.46	53.71	82.8%
Newport	3.93	7.00	5.07	1.70	5.88	5.75	4.21	33.54	57.47	58.4%
Laurel Mtn.	5.51	16.32	13.54	1.94	14.08	8.09	8.84	68.32	100.92	67.7%
Portland	2.38	3.91	1.94	1.30	3.77	3.49	4.34	21.13	28.98	72.9%
Eugene	2.21	4.11	1.66	1.27	3.57	2.55	3.85	19.22	42.35	45.4%
G. Camp	6.23	8.52	5.62	2.27	7.97	6.29	7.25	44.15	71.40	61.8%
Oakridge	1.89	6.98	1.43	1.93	5.25	4.79	5.54	27.81	37.34	74.5%

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Figures 1 and 2 depict the February and May 2005 precipitation anomalies for the Pacific Northwest. The charts on pages 6 through 9 show the 2004-2005 pre-fire season precipitation compared to normal.



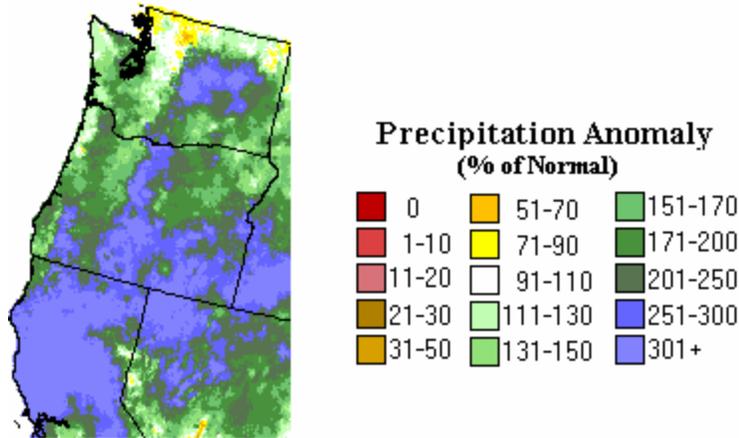
FEBRUARY 2005 PRECIPITATION ANOMALY

FIGURE 1: FEBRUARY 2005 PRECIPITATION ANOMALY (COURTESY OF OREGON CLIMATE SERVICE)

The average daily measured Energy Release Component (ERC) for zones 605, 607, and 660 climbed above 10 on July 12, 2005. In 2004, ERC values were above 10 by mid-June. On August 15th, the average ERC for all available stations in zones 605, 607, and 660 was 67. The average 100-hour fuel moisture value in the South Washington and North Oregon Cascades and foothills for the period May 11-20 was 27.4 percent. The 100-hour fuel moistures lowered to 10.0 percent by the end of July.

Water Year precipitation at the Portland Airport, for the period October through February, totaled 12.95 inches. The years 1977 and 2001 were drier, with 7.19 inches and 11.94 inches, respectively. Normal precipitation for the October through February period is 23.45 inches. The Salem airport recorded 11.39 inches for the same period. The only other year that was drier occurred in 1977.

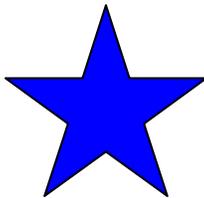
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**MAY 2005
PRECIPITATION ANOMALY**

FIGURE 2: MAY 2005 PRECIPITATION ANOMALY (COURTESY OF OREGON CLIMATE SERVICE)

Figure two (above) shows the extremely wet conditions over the Pacific Northwest during May 2005. Many areas in Southwest Washington and Northwest Oregon received in excess of 175 percent of normal precipitation. The Willamette Basin had 186 percent of normal. The Rogue and Umpqua Basins had 271 percent of normal precipitation.

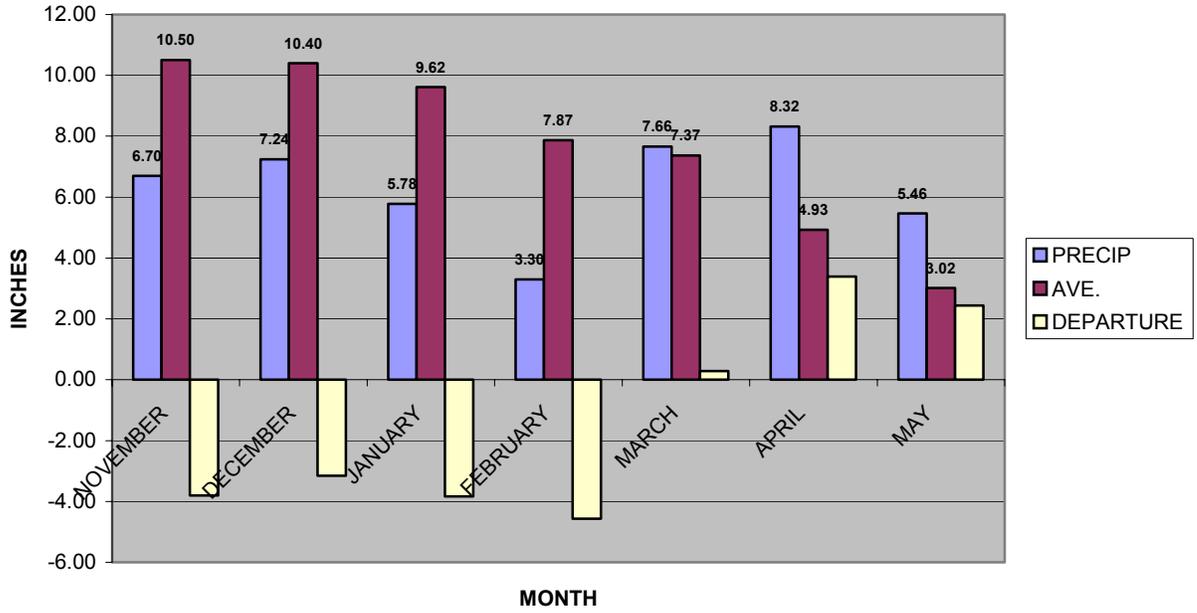


Marion Forks received 8.06 inches of precipitation in May, 2005. This total represents 203 percent of the average normal rainfall. Belknap Springs (zone 608) had 7.57 inches of precipitation, which was 190 percent of normal.

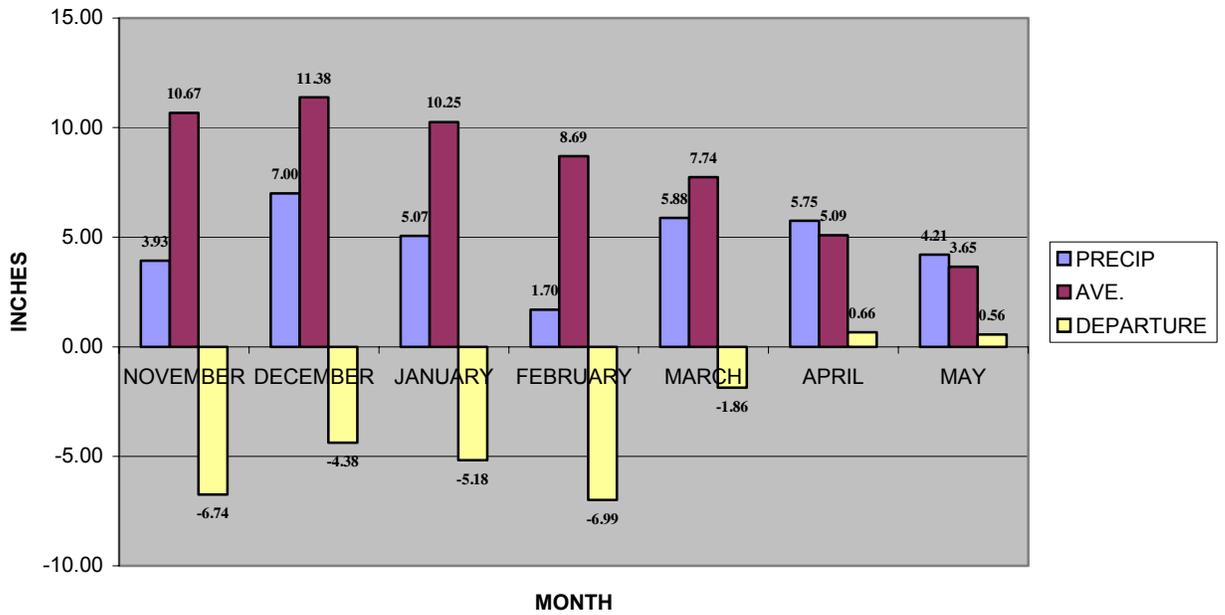
On May 18, Horse Creek RAWS (zone 605) picked up 2.19 inches of rain. Log Creek RAWS, in zone 607, had 2.14 inches, and Hamilton Mountain, in zone 660, had two inches. Horse Creek RAWS had a total of 8.10 inches of rainfall in May.

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**2004-2005 WET SEASON
ASTORIA**

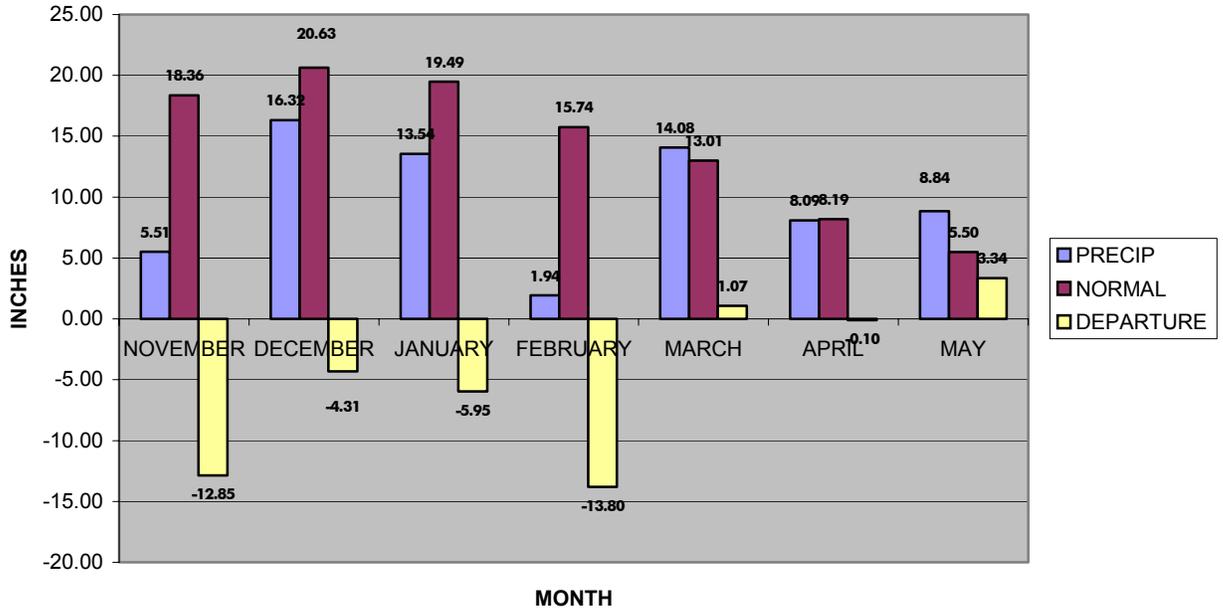


**2004-2005 WET SEASON
NEWPORT**

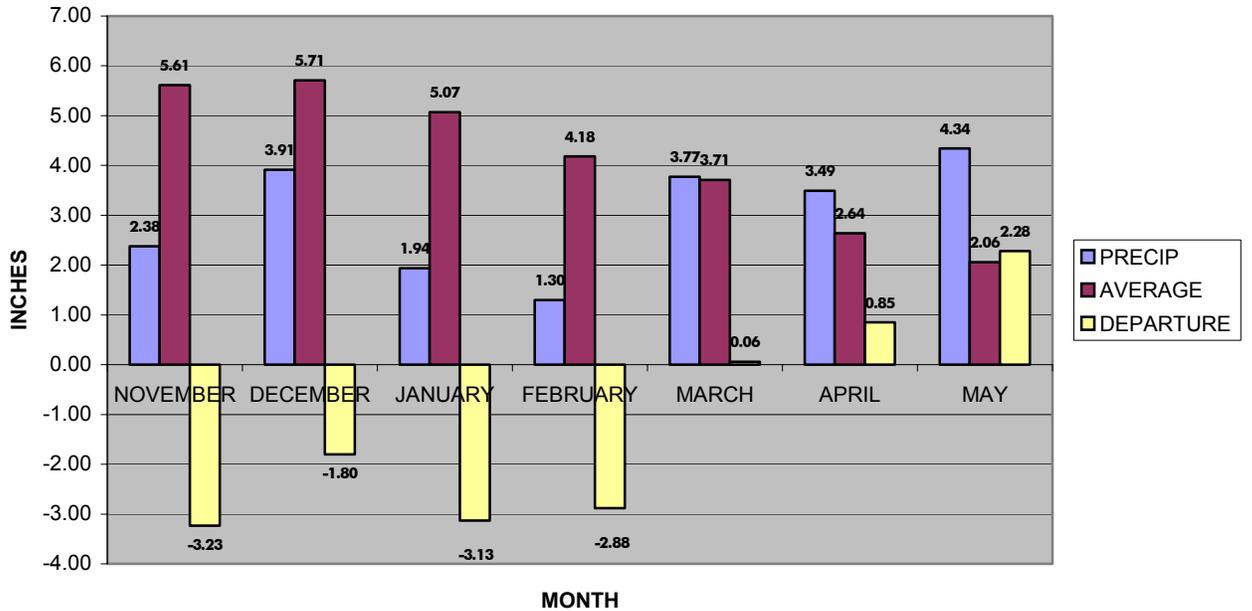


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**2004-2005 WET SEASON
LAUREL MOUNTAIN**

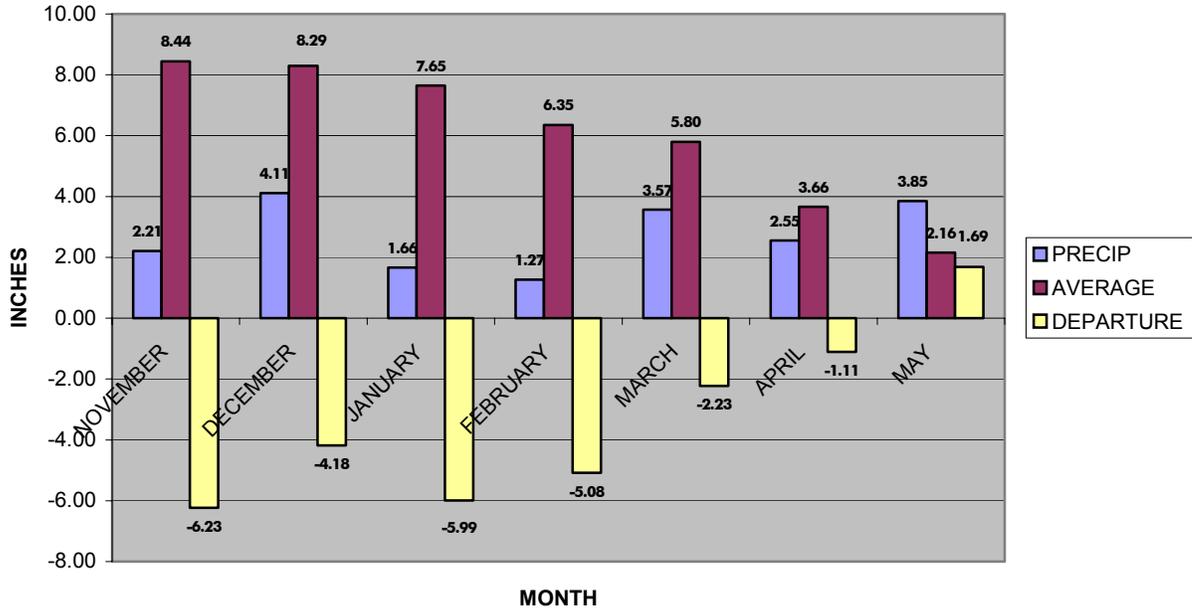


**2004-2005 WET SEASON
PORTLAND**

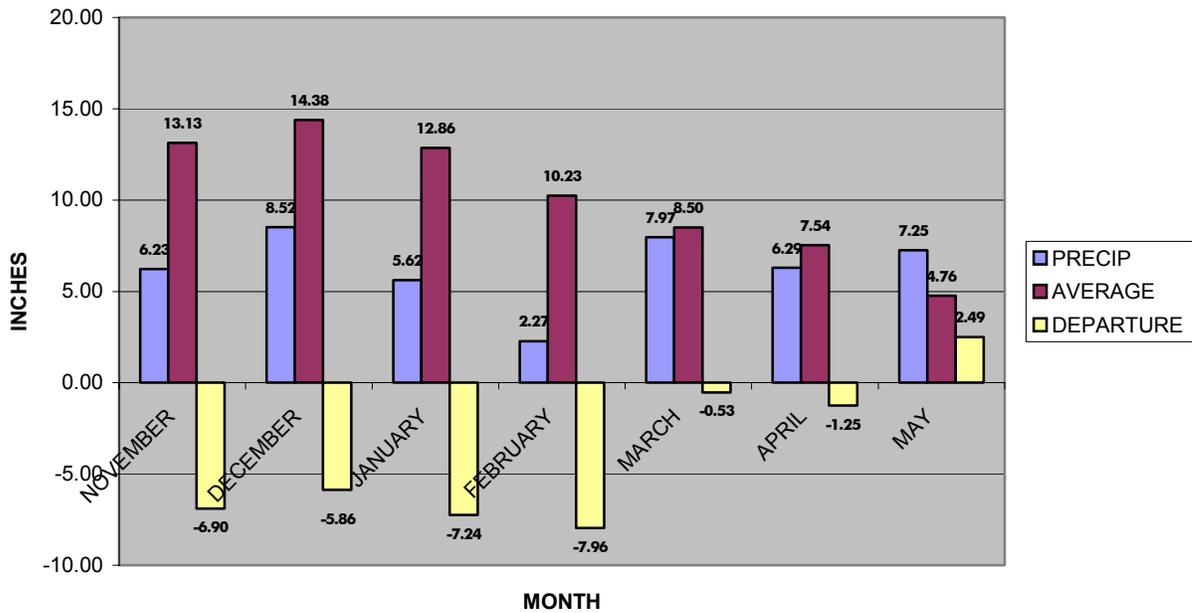


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**2004-2005 WET SEASON
EUGENE**

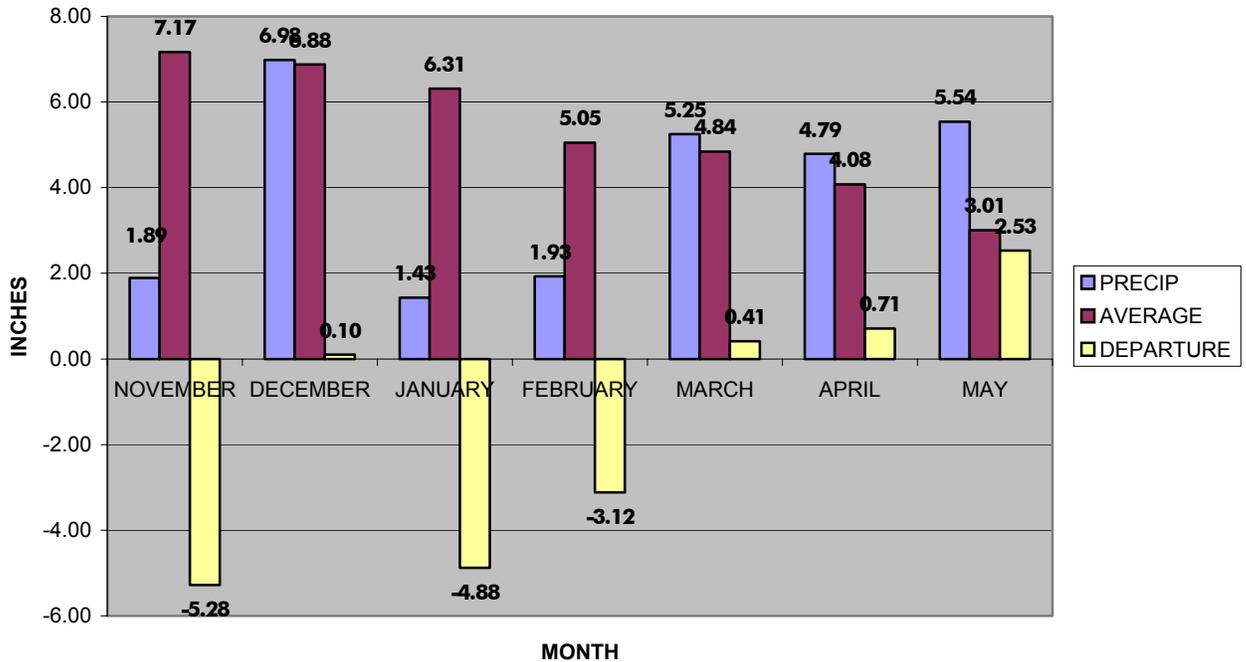


**2004-2005 WET SEASON
GOVERNMENT CAMP**



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2004-2005 WET SEASON OAKRIDGE



FAST FACTS: Zones 606 and 608 recorded median precipitation of 0.25 inches or more on four days during the period June 1-10. On June 1st, Yellowstone RAWS (zone 606) picked up 1.17 inches of rain. Four days later, on the 5th, Yellowstone recorded another 1.82 inches.

Eagle Creek RAWS, in zone 605, registered a 10-minute wind speed of 18 mph at 1100 PDT May 25th. Hamilton Mountain, zone 660, had a 10-minute wind speed of 17 mph at 1300 on the same day. Log Creek, zone 607, had a 10-minute wind speed of 16 mph.

Boulder Creek RAWS (zone 608) is in a sheltered, elevated valley. This location can be several degrees colder at night compared to its neighbors (Pebble and Fields). Boulder Creek had four occasions when the minimum temperature was below 30 degrees. The coldest low was 27 degrees on September 24th. On May 24th, the morning low at Boulder Creek was 28 degrees.

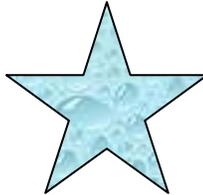
Red Box Bench is another cold elevated valley in zone 607. Low temperatures were at or below freezing five days at Red Box Bench. The coldest morning was 30 degrees on September 24th. Wanderer's Peak, also in zone 607, recorded a low of 32 degrees on June 6th.

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2004-2005 SNOW PACK DATA (FOR GOVERNMENT CAMP)

The 2004-2005 Government Camp snow-depth data (Figure 3) is shown on page 11. The chart also includes data from 2003-2004 and the normal snow depth. It is quite obvious that 2004-2005 snow fall was rather abysmal. Typically, by Christmas, there should be 25 inches on the ground. In 2004, there were just three inches. Conditions did not improve much the rest of the snow season. A few minor storms in mid-January managed to bring the snow depth to 19 inches, but this was followed by a prolonged dry spell. In fact, on January 24th, the snow depth had dwindled to zero. The most surprising aspect for 2005 was the absence of snow in March. In a normal year, the snow depth peaks in early March at 50 inches. In March 2005 there was no snow pack at all, except during the final four days. However, the snow did not last long. The snow depth diminished from 20 inches on April 1st to five inches on the 8th.

Snow cover is gone, on average, around June 10th. The past two years have been unusual. In 2005, the snow cover was gone by April 19th. Despite an average snow pack in early March of 2004, it disappeared by April 10th. A couple minor weather systems later in the month resulted in minimal snow cover, but the snow was gone for good on April 26th.



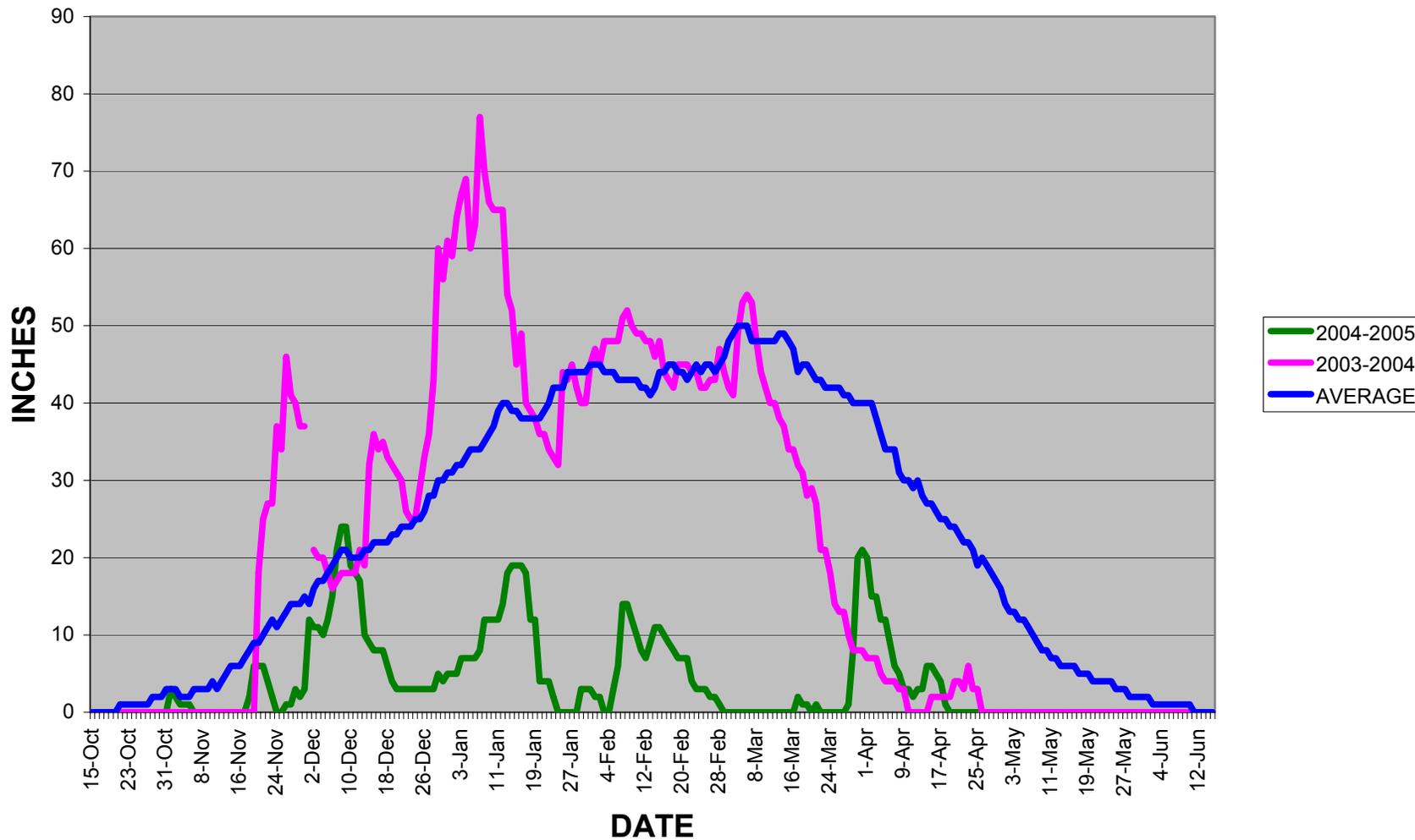
INTERESTING TIDBITS: The most devastating wildfire, in terms of fatalities, occurred in Peshtigo, Wisconsin in 1871. The death toll was 1300 people and 1 million acres burned.

The National Park Service allowed several lightning-caused fires to burn in Yellowstone National Park in July 1988 as dictated by Park Service policy. However, these fires eventually cost taxpayers \$120 million. The annual budget, at the time, was \$17.5 million.

Aircraft accidents and burnovers accounted for 52% of all wildland fire deaths in the period 1990-1998.

Cedar Creek RAWS (zone 601) registered humidity recovery of 40 percent or less nine times. On May 26th the humidity recovery was just 23 percent. On the 27th, the recovery was 27 percent. A few other coastal stations had poor recovery on May 26th. Tillamook RAWS had 27 percent, and Cannibal RAWS reported just 31 percent.

FIGURE 3 - GOVERNMENT CAMP SNOWDEPTH



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2005 FIRE SEASON LIGHTNING DATA

Table two shows the lightning frequency for the 2005 season.

TABLE TWO: 2005 LIGHTNING DATA (MAY THROUGH OCTOBER)

AREA	# LIGHTNING DAYS 2005	AVE. # DAYS (LAST 12 YEARS)	PERCENT AVE.
ZONES 601/612	18	7.3	246.6%
ZONES 602/603	20	7.3	274.0%
ZONE 604	18	8.6	209.3%
ZONES 605/607/660	18	12.5	144.0%
ZONES 606/608	19	18.5	102.7%

TABLE TWO: 2005 LIGHTNING FREQUENCY. DATA OBTAINED FROM BLM LIGHTNING DETECTION AND NORTHWEST COORDINATION CENTER

A cursory look at the above lightning data would seem to suggest 2005 was an active thunderstorm season. Nearly all areas showed well above-normal lightning frequency, generally 150 to 250 percent of normal. It is interesting to note that the Cascade areas exhibited the lowest averages, 100 to 150 percent of normal. Another interesting result is the lightning distribution. All areas had similar lightning day totals. The monthly distribution (not shown) helps to explain the lightning abundance. Cold upper level troughs characterized May and June, a pattern conducive to lightning, especially over the Coast Range and inland valleys. The Coast Range zones, 602 and 603, had 13 days of lightning from May 1st through June 20th. The Central Oregon Cascades and foothills also had 13 lightning days during the same period. Generally, about 60 to 65 percent of all lightning days occurred from May through early mid-June, when fuel conditions were “green” (very low risk of large fire development). Fortunately, there was very little lightning during critical fuel conditions. The most critical period was the end of August, when ERC values were well above 90th percentile historical levels. The Cascade areas had 1 to 2 lightning days from August 21st to 31st. There were six wildfire spot requests in August, only one of which occurred during the period August 21-31.

On June 5th, four RAWS sites recorded 1.50 or more inches of rainfall. The most, 1.95 inches, was at Wilkinson (zone 603). Cedar Creek (zone 601) had 1.91 inches, and Yellowstone (zone 606) had 1.82 inches. Cedar Creek picked up an additional 2.55 inches on the sixth, for a two-day total of 4.46 inches. Cannibal RAWS had 1.63 inches on the sixth.

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“Problematic lightning”, formerly referred to as “episode lightning,” was not a major factor in 2005. Normally, there are at least one or two critical fire weather patterns, such as a breakdown of an upper ridge, Haines 6 conditions, or lightning after an extended dry period during the fire season that result in problematic lightning. These isolated events result in the majority of large fires. There were a couple of upper ridge breakdowns in 2005, but no Red Flag events. The Portland Forecast Office issued Red Flag Warnings for three events during the 2005 season. Two events were low humidity and east wind, and the other was for dry and unstable conditions. It is unusual not to have at least one east-wind event in September or October.

The lightning criteria for the Portland forecast area were modified over the past couple of seasons in an attempt to better represent the true problem patterns. “Dry” lightning is hard to forecast and harder still to verify. The Northwest Coordination Center developed a more objective analysis and called it “problematic lightning”. The general premise is to combine lightning potential with observed and forecast fuel conditions. A Red Flag Warning is warranted when lightning is expected **and** fuel conditions are forecast to remain moderate or critical during and after the weather event. Also, lightning activity must be scattered, or greater, in coverage.

WILDFIRE FACTS: Two of the most deadly burnover incidents in recent history occurred on the Dude Ranch Fire (1990) and the South Canyon Fire (1994). There were six fatalities on the Dude Ranch Fire and 14 deaths on the South Canyon Fire. Thorough investigation of burnover incidents found that the majority of such events occur during initial attack or extended initial attack.

Many wildfire fire fatalities are directly attributed to the failure to follow the “10 Standard Fire Orders” and “18 Situations that shout ‘Watch Out’.”

The South Canyon Fire investigative summary concluded that the fire blew up at 1600 PDT July 6th. The maximum rate of spread was 18 mph, with flame lengths as high as 300 feet. It was found that escape routes and safety zones were inadequate. Eight of the “10 Standard Fire Orders” were compromised.



FIGURE 4 – PORTABLE STATION

Volunteer firefighters are the most likely to die on a wildland fire. Recent published statistics showed that 31 percent of wildland fire fatalities involved volunteer firefighters.